What is claimed is:

SUB A2

1. An apparatus forming a resist pattern, comprising:

(a) a coating and developing apparatus, having:

a carrier mounting portion holding a substrate carrier that holds a plurality of substrates with a base film being formed thereon,

a transfer mechanism receiving and conveying the substrate from the substrate carrier placed on the carrier mounting portion,

a coating unit supplying a resist solution from a nozzle thereto, holding the substrate conveyed from the transfer mechanism horizontally at a substrate holder, rotating the substrate holder to spread the resist solution with a centrifugal force and forming a resist film on a surface of the substrate,

a developing unit supplying a developing solution of a predetermined temperature on the surface of the substrate after an exposure with the resist solution being supplied thereon, then leaving the supplied developing solution for a predetermined time period and develops the surface of the substrate; and

(b) an inspection unit measuring and outputting a data of at least one of measurement items selected from, a reflection ratio and a film thickness of the base film, a film thickness of the resist film, a line width after the development, an accuracy that the base film matches with a resist pattern, and a defect on the

surface of the substrate after the development; and,

(c) a controller amending a set value based on the measured data of the inspection unit selected from at least for one of parameters subject to the amendment, a rotating speed and a degree of acceleration of the substrate holder in the coating unit, a position of the nozzle, a time period for the development and a temperature of the developing solution in the developing unit.

2. The apparatus as set forth in claim 1,

wherein the inspection unit is provided in the coating and developing apparatus.

3. The apparatus as set forth in claim 1, further comprising:

an aligner having an exposing portion with a light source and a lens, radiating a ray of a predetermined intensity for a predetermined time period using a predetermined pattern mask and exposing the substrate being disposed at a focus point of the lens,

wherein the controller amends the set value based on the measured data of the measurement items selected from at least for one of the parameters subject to the amendment, an intensity of the ray radiated from the exposing portion on the substrate, a time period for the exposure, an alignment of the exposing portion and the substrate, and a distance between the focus point of the exposing portion and the substrate.

4. The apparatus as set forth in claim 1, further comprising:

a heat processing unit heating the substrate at a predetermined temperature for a predetermined time period,

wherein the controller amends the set value based on the measured data of the measurement items selected from at least for one of the parameters subject to the amendment, a time period for heating and a temperature for heating.

5. The apparatus as set forth in claim 1,

wherein the inspection unit has a base film measuring portion measuring at least one of the reflection ratio and the film thickness of the base film being formed on the surface of the substrate and outputting the measured data,

wherein the controller amends the set value based on the measured data of the base film measuring portion selected from at least for one of the parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder in the coating unit, the time period for the development in the developing unit, the intensity of the ray radiated from the exposing portion in the aligner to the substrate, and the time period for the exposure.

6. The apparatus as set forth in claim 1,

wherein the inspection unit has a film thickness

measuring portion measuring the film thickness of the resist film formed on the surface of the substrate and outputting the measured data,

wherein the controller amends the set value based on the measured data of the resist film selected from at least for one of the parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder in the coating unit, the intensity of the ray radiated from the exposing portion in the aligner on the substrate, and the time period for the exposure.

7. The apparatus as set forth in claim 1,

wherein the inspection unit has a line width measuring portion measuring the line width after the development process and outputting the measured data,

wherein the controller amends the set value based on the measured data of the developed line width selected from at least for one of the parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder in the coating unit, the time period for the development and the temperature of the developing solution in the developing unit, the intensity of the ray radiated from the exposing portion in the aligner on the substrate, and the time period for the exposure, the distance between the focus point of the exposing portion and the substrate, the temperature for heating and the time

period for heating.

8. The apparatus as set forth in claim 1,

wherein the inspection unit has a matching accuracy measuring portion measuring the accuracy that the base film matches with the resist pattern and outputting the measured data,

wherein the controller amends the set value based on the measured data of the matching accuracy measuring portion for the parameter regarding the alignment of a position of the substrate and the exposing portion in the aligner that is subject to the amendment.

9. The apparatus as set forth in claim 1,

wherein the inspection unit has a defect measuring portion measuring the defect on the surface of the substrate after the developing process and outputting the measured data,

wherein the controller amends the set value based on the measured data of the defect measuring portion selected from at least for one of the parameters subject to the amendment, the position of the nozzle in the coating unit, the time period for the development and the temperature of the developing solution in the developing unit, the intensity of the ray radiated from the exposing portion on the substrate in the aligner, the time period for the exposure, and the distance between the focus point of the exposing portion and the substrate.

10. The apparatus as set forth in claim 1, further comprising:

an etching apparatus supplying an etching gas of a predetermined composition ratio for a predetermined time period and etching the substrate;

an etched line width measuring portion measuring the etched line width after the etching and outputting the measured data,

wherein the controller amends the set value based on the measured data of the etched line width selected from at least for one of the parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder in the coating unit, the time period for the development and the temperature of the developing solution in the developing unit, the time period for the exposure and the intensity of the ray radiated from the exposing portion on the substrate, the distance between the focus point of the exposing portion and the substrate, the time period and the temperature for heating in the heating unit, and the time period for etching and the composition ratio of the etching gas in the etching apparatus.

11. The apparatus as set forth in claim 10, further comprising:

an etching defect measuring portion measuring the defect on the surface of the substrate after the

etching and outputting the measured data,

wherein the controller amends the set value based on the measured data of the etching defect measuring portion selected from at least for one of the parameters subject to the amendment, the position of the nozzle in the coating unit, the time period for the development and the temperature of the developing solution in the developing unit, and the time period for the exposure and an intensity of the ray radiated from the exposing portion in the aligner on the substrate, the distance between the focus point of the lens and the substrate in the exposing portion and the time period for etching and the composition ratio of the etching gas in the etching apparatus.

12. The apparatus as set forth in claim 1,

wherein the controller stores a plurality of data regarding a contribution degree in relation to eliminating the cause of the amendment in advance, while each of the data is correlated to each of a plurality of kinds of said parameters when amending the parameters subject to the amendment.

13. The apparatus as set forth in claim 12,

wherein the controller amends the parameter with the higher contribution degree before the parameter with the lower contribution degree in relation to eliminating the cause of the amendment

14. The apparatus as set forth in claim 1,

wherein the controller stores a data regarding a contribution degree relevant to each of a plurality of causes in determining the value of measurement item in advance, and sets up each of said causes depending on the target value of the measurement item with taking said contribution degree relevant to each of the plurality of causes into consideration.

15. A resist pattern forming apparatus, comprising:

(a) a system, conjunctively having:

a coating and developing apparatus, having:

a carrier mounting portion holding a substrate carrier that holds a plurality of substrates with a base film being formed thereon,

a transfer mechanism receiving and conveying the substrate from the substrate carrier placed on the carrier mounting portion,

a coating unit supplying a resist solution from a nozzle thereto, holding the substrate conveyed from the transfer mechanism at a substrate holder, rotating the substrate holder to spread the resist solution with a centrifugal force and forming a resist film on a surface of the substrate, and

a developing unit supplying a developing solution of a predetermined temperature on the surface of the exposed substrate with the resist solution being supplied thereon, then leaving the supplied developing solution for a predetermined time period and develops the

surface of the substrate,

an aligner having an exposing portion with a light source and a lens, radiating a ray of a predetermined intensity for a predetermined time period using a predetermined pattern mask and exposing the substrate being disposed at a focus point of the lens, and

an etching apparatus supplying an etching gas of a predetermined composition ratio to the substrate for a predetermined time period;

(b) an inspection unit measuring at least one of measurement items, a reflection ratio of the base film, a film thickness of the base film, a film thickness of the resist film, a line width after the development, an accuracy that the base film matches with the resist pattern, and a defect on the surface of the substrate after the development and outputting the data thereof as a first measured data, and measuring an etched line width after the etching, outputting the data thereof as a second measured data; and

(c) a controller for amending a set value based on the first measured data of the inspection unit selected from at least for one of the parameters subject to the amendment, a rotating speed and a degree of acceleration of the substrate holder in the coating unit, a position of the nozzle, a time period for the development and a temperature of the developing solution in the developing unit while the controller

amends a set value based on the second measured data selected from at least for one of the parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder in the coating unit, the time period for the development and the temperature of the developing solution in the developing unit, a time period for the exposure, an intensity of the ray radiated from the exposing portion on the substrate in the aligner, a distance between the focus point of the exposing portion and the substrate, a time period and a temperature for heating in the heating unit, a time period for etching and the composition ratio of the etching gas in the etching apparatus.

16. A resist pattern forming method, comprising the steps of:

(a) forming a resist film on a surface of a substrate with supplying a resist solution from a nozzle thereto and rotating the substrate holder to spread the resist solution with a centrifugal force while holding the substrate with a base film being formed thereon horizontally at a substrate holder,

(b) exposing the substrate coated with the resist solution and being disposed at a focus point of a lens in an exposing portion having a light source and the lens, with radiating a ray of a predetermined intensity for a predetermined time period, using a predetermined

pattern mask;

(c) developing the surface of the substrate with supplying a developing solution of a predetermined temperature on the surface the exposed substrate with the resist solution being supplied thereon, then leaving the supplied developing solution for a predetermined time period;

(d) measuring data of at least one of measurement items selected from, a reflection ratio and a film thickness of the base film, a film thickness of the resist film, a line width after the development, an accuracy that the base film matches with a resist pattern, and a defect on the surface after the development;

(e) amending a set value based on a measured data selected from at least for one of the parameters subject to the amendment, a rotating speed, a degree of acceleration and a position of the nozzle when coating the resist solution, a time period for the development and a temperature of the developing solution when developing the substrate, an intensity of the ray radiated from the exposing portion on the substrate, a time period for the exposure, an alignment of exposing portion and the substrate, and a distance between the focus point of the exposing portion and the substrate.

17. The method as set forth in claim 16,

wherein the step (e) amends the set value

corresponding to the measured item out of a plurality of said parameters subject to the amendment, when the measured data of the base film is over a permissible range and within a range of the amendment, selected from at least for one of the parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder, the time period for the development, the intensity of the ray radiated from the exposing portion to the substrate, and the time period for the exposure.

18. The method as set forth in claim 16,

wherein the step (e) amends the set value corresponding to the measured item out of a plurality of said parameters subject to the amendment, when the measured data of the thickness of the resist film is over a permissible range and within a range of the amendment, selected from at least for one of the parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder, the time period for the development, an intensity of the ray radiated from the exposing portion to the substrate, and the time period for the exposure.

19. The method as set forth in claim 16, further comprising a step of:

heating the substrate after the application of the resist solution and the exposure, at a predetermined temperature for a predetermined time period;

wherein the step (e) amends the set value of the corresponding to the measured item out of a plurality of said parameters subject to the amendment when the measured data of the developed line width is over a permissible range and within a range of the amendment, selected from at least for one of the parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder, the time period for the development, the temperature of the developing solution, the intensity of the ray radiated from the exposing portion to the substrate, the time period for the exposure, the distance between the focus point of the exposing portion and the substrate, and a time period for heating and a temperature for heating.

20. The method as set forth in claim 16,

wherein the step (e) amends the set value corresponding to the measured item out of a plurality of said parameters subject to the amendment when the measured data of the accuracy that the base film matches with the resist pattern after the development process is over a permissible range and within a range of the amendment selected from a parameter of an alignment of the exposing portion and the substrate subject to the amendment.

21. The method as set forth in claim 16,

wherein the step (e) amends the set value of corresponding measured item out of a plurality of said

parameters subject to the amendment when the measured data of the default on the surface of the substrate is over a permissible range and within a range of the amendment, selected from at least for one of the parameters subject to the amendment, the position of the nozzle, the time period for the development and the temperature of the developing solution in the development step, the intensity of the ray radiated from the exposing portion on the substrate, the time period for the exposure, and the distance between the focus point of the exposing portion and the substrate.

22. The method as set forth in claim 16, further comprising a step of:

etching the substrate by supplying an etching gas of a predetermined composition ratio to the substrate for a predetermined time period.

wherein the step (e) amends the set value based on the measured data of the etched line width when the measured data of the etched line width after the etching is over a permissible range and within a range of the amendment, selected from at least for one of the plurality of parameters subject to the amendment, the rotating speed and the degree of acceleration of the substrate holder, the time period for the development, the temperature of the developing solution, the time period for the exposure, the intensity of the ray radiated from the exposing portion to the substrate,

the distance between the focus point of the exposing portion and the substrate, the time period for the heating and the temperature for the heating.

23. The method as set forth in claim 16,

wherein the step (e) amends a predetermined value based on the measured data of the etched line width when the measured data of the etched line width after the etching is over a permissible range and within a range of the amendment, selected from at least for one of the plurality of parameters subject to the amendment, the position of the nozzle, the time period for the development, the temperature of the developing solution, the time period for the exposure, the intensity of the ray radiated from the exposing portion on the substrate, the distance between the focus point of the exposing portion and the substrate, a time period for etching and a composition ratio of the etching gas.